



UNIVERSITY OF MAINE AT FARMINGTON
COLLEGE OF EDUCATION, HEALTH AND REHABILITATION

LESSON PLAN FORMAT

[L3 Katelin Carey](#)

Teacher's Name: Ms. Carey **Lesson #: 3** **Facet:** Application

Grade Level: 8 **Numbers of Days:** 3

Topic: Geometry

PART I:

Objectives

Student will understand that the Pythagorean Theorem can be used to find unknown distances.

Student will know Pythagorean Theorem, right angle, right triangle, hypotenuse, legs, polygon
Pythagorean Theorem- $a^2 + b^2 = c^2$, isolating variable, square root, substitution, solving equations, distance.

Student will be able to do solving equations and find unknown distances.

Product: Geogebra

Maine Learning Results (MLR) or Common Core State Standards (CCSS) or Next Generation Science Standards (NGSS) Alignment

Common Core State Standards

Content Area: Geometry

Grade Level: Grade 8

Domain: Geometry

Cluster: Understand and apply the Pythagorean Theorem

Standard: 8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Rationale: Students will know how to use the Pythagorean Theorem to find unknown distances.

Assessments

Formative (Assessment for Learning)

Section I – checking for understanding strategy during instruction

The teacher will check for understanding by giving a quickie quiz/quick write to see if all the students are up to pace with the lessons so they know if they need to practice more in depth and there will be a Pythagorean Theorem board game that students will pass in their work after doing problems dealing with what they know about the Pythagorean Theorem up to this point.

Section II – timely feedback for products (self, peer, teacher)

The teacher will have students assess their peers after they do an activity in the classroom to find distances and then the teacher will assess them on what they saw in class through commenting to them with a sticky note feedback. Students will also get feedback on their work on their Pythagorean Theorem board game.

Summative (Assessment of Learning):

On Geogebra, students will make two shapes in random places on the grid. Then, show how you can find the distances between two of the points, using the Pythagorean Theorem. Make sure to label your points and write a summary explaining what you have done and how you found your distances. Find three different distances between two points and send your file to me. **50 points**

Integration

Technology (SAMR):

Geogebra is on a Modification level because students can have perfectly created shapes and find really precise distances, along with a perfect grid and formula answers on the computer in seconds.

Content Areas:

English: Students have to write a summary explaining what they have done and their process when using Geogebra.

Groupings

Section I - Graphic Organizer & Cooperative Learning used during instruction

Students will be doing the distance organizer for them to start seeing that the numbers they just find with the Pythagorean Theorem is really distances that relate to their real world. Their cooperative learning activity will be a distance activity in the class where they have a partner and stand anywhere in the room and talk about how they would create a right triangle and find the distances, and then a class discussion will take place. They will also play a Pythagorean Theorem board game where they will use their knowledge of everything they've learned about the Pythagorean Theorem up to this point.

Section II – Groups and Roles for Product

Students will be working individually for their Geogebra project and with a small group for their board game.

Differentiated Instruction

MI Strategies

Logical: Students will have to really think through their knowledge of the Pythagorean Theorem to be able to find the distance between the shapes on Geogebra and themselves in the activities.

Verbal: When students do the distance activity, the teacher will ask them to share how the partners figured out how they could find their distance and what they learned in the activity.

Visual: On Geogebra students will be able to draw triangles and visually see how to use the Pythagorean Theorem on a grid between two points.

Intrapersonal: Students will be doing an activity with partners that they are able to discuss the Pythagorean Theorem and how to find distances and discuss with the class.

Interpersonal: Students will be allowed to play the distance activity using the Pythagorean Theorem and also assess their peers on how well they think they understood finding distances using the Pythagorean Theorem.

Kinesthetic: The teacher will have students do a quick activity with a partner and stand apart from each other somewhere in the room, and then try to figure out how they could find the distance between the two of them.

Modifications/Accommodations

From IEP's (Individual Education Plan), 504's, ELLIDEP (English Language Learning Instructional Delivery Education Plan) I will review student's IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.

Plan for accommodating absent students:

If you miss a class, it is your responsibility to get your missing work and notes. Any handouts you missed will be in the back of the room in your class's folder with your name on them. After you get the notes from a peer and your handouts, discuss with me your due dates as I am willing to compromise depending on circumstances. If you have missed more than three days in a row, we can work out an alternative assignment.

Extensions

Technology (SAMR): Gifted Students: For gifted students, their challenge will be to find more than

three distances with various shapes on Geogebra.

Materials, Resources and Technology

List all the items you need for the lesson.

- Computers with Geogebra installed
- Dongle
- Pythagorean Theorem board game pieces
- Dice

Source for Lesson Plan and Research

List all URL and describe.

http://www.dgelman.com/graphicorganizers/geometry/pythagoreanththeorem/Pythagorean_Theorem01.pdf

Graphic Organizer

<http://betterexplained.com/articles/measure-any-distance-with-the-pythagorean-theorem/> Resource of more explanation

<https://www.youtube.com/watch?v=OZp7ToriFko> Video with coordinate systems

<https://www.youtube.com/watch?v=yaj9P-SS2GU> Another video with coordinate systems

https://learnzillion.com/lesson_plans/7562-find-distance-between-two-points-on-the-coordinate-plane-using-the-pythagorean-theorem Video lesson finding distance with coordinates and triangles

<http://www.themathpage.com/alg/pythagorean-distance.htm> Relating Pythagorean Theorem to distance formula

<https://www.youtube.com/watch?v=1cBXWi66-tY> Geogebra tutorial

<https://www.youtube.com/watch?v=J7Yrlrf8gOE> Another Geogebra tutorial

http://themathworksheetsite.com/cgi-bin/coordinate_plane.pl Blank Coordinate Plane worksheet

[http://www.math-](http://www.math-aids.com/cgi/pdf_viewer_4.cgi?script_name=pythagoras_distance.pl&quadrant=1&language=0&memo=&answer=1&x=104&y=40)

[aids.com/cgi/pdf_viewer_4.cgi?script_name=pythagoras_distance.pl&quadrant=1&language=0&memo=&answer=1&x=104&y=40](http://www.math-aids.com/cgi/pdf_viewer_4.cgi?script_name=pythagoras_distance.pl&quadrant=1&language=0&memo=&answer=1&x=104&y=40)Create your own worksheet

[https://docs.google.com/document/d/1AHp-wnJMiu4-5CwhxY8l3PD63-](https://docs.google.com/document/d/1AHp-wnJMiu4-5CwhxY8l3PD63-E1DjsXKJyi3mAJNGU/edit)

[E1DjsXKJyi3mAJNGU/edit](https://docs.google.com/document/d/1AHp-wnJMiu4-5CwhxY8l3PD63-E1DjsXKJyi3mAJNGU/edit) Pythagorean Theorem Board Game

PART II:

Teaching and Learning Sequence (Describe the teaching and learning process using all of the

information from part I of the lesson plan) *Take all the components and synthesize into a script of what you are doing as the teacher and what the learners are doing throughout the lesson. Need to use all the WHERETO's. (1-2 pages)*

Describe your classroom arrangement.

The classroom will be arranged in a t like y and x-axis grid.

Agenda (include days and times)

Day 1:

Quick Review (2 Minutes)

Distance Activity Hook (3 minutes)

Graphic Organizer Alone (8 Minutes)

Discussion and go over graphic organizer (7 Minutes)

Examples on board (15 Minutes)

Worksheet packet with grid to practice (30 minutes)

Introduction to Geogebra (15 Minutes)

Homework: Grid distance problems worksheet.

Day 2:

Go over homework (5 Minutes)

A few more examples with different shapes instead of dots (5 Minutes)

Pythagorean Theorem board Game (30 minutes)

Class Discussion (5 Minutes)

Geogebra project introduced (5 Minutes)

Geogebra tutorial Video (10 Minutes)

Work on project/Get familiar with Geogebra (15 Minutes)

Quickie quiz/quick write (5 Minutes)

Homework: Try to work on project.

Day 3:

Finish projects (55 Minutes)

Talk about how it went, what didn't work (25 Minutes)

Teaching and Learning Sequence (Include all hyperlinks of the above URL's in this section.)

Student will understand that the Pythagorean Theorem can be used to find unknown distances and how to use the Pythagorean Theorem on a coordinate grid to find distances between points. By learning this, students will be able to relate the Pythagorean Theorem to finding distances in real life, and they will realize that the Pythagorean Theorem is useful in many situations. The desks will be arranged in the y and x-axis shape so the coordinate grid can really come alive in the lesson. The hook students will participate in will be a distance activity where students will have a partner and stand anywhere in the room to spark a discussion on how they could use the Pythagorean Theorem to find the distance between them.

Where, Why, What, Hook Tailors: Kinesthetic, Intrapersonal, Verbal

Students will know Pythagorean Theorem, right angle, right triangle, hypotenuse, legs, polygon
Pythagorean Theorem- $a^2 + b^2 = c^2$, isolating variable, square root, substitution, solving equations, distance (see content notes). The [graphic organizer](#) is going to be done alone first, and it asks for questions that students can answer alone. Then, we will go over it as a class to clear up any misconceptions. This will introduce students to distances on a [coordinate grid](#). The Cooperative Learning activity is going to be a [Pythagorean Theorem board game](#) that will ask students questions and they will play this in small groups. They will have to pass in all their work to show what they have done. Students will complete a quick write/quickie quiz for the teacher to see where the students are on the material and how they are feeling. The teacher will also be giving feedback on their Pythagorean Theorem game work.

Equip, Explore, Rethink, Tailors: Intrapersonal, Interpersonal, Kinesthetic, Verbal, Visual, Logical

Student will be able to do solving equations and find unknown distances using the Pythagorean Theorem. Students will be using [Geogebra](#) to make shapes and find the distance between two points using the Pythagorean Theorem. They will be taking screen shots and writing a summary explaining the process they experienced after. Students will be grouped by levels when playing the Pythagorean Theorem board game, and in partners of their choice when doing the distance activity. Students will be working alone to create their Geogebra project. Students will have a small class discussion on how they think the class is doing to assess their peers and the teacher. They will also have a chance to tell the teacher how they are feeling in a quick write where they can say anything they would like and the teacher will comment on it and pass it back the next day. Students will receive feedback on their Pythagorean Theorem board game work and then they will also receive feedback on their Geogebra project and have one chance to revise and resubmit.

Experience, Revise, Refine, Tailors: Interpersonal, Intrapersonal, Visual, Kinesthetic, Logical

Students will receive feedback on their quick writes, in a class discussion, on their Pythagorean Theorem board game work, and on their Geogebra product. They will not be scored on anything besides their Geogebra product after they resubmit as long as they have completed all assignments beforehand. This will all connect to the students' knowledge of distance between two-three objects in real life. The shapes will connect to the next lesson where students will be finding right triangles in other shapes to be able to use the Pythagorean Theorem.

Evaluate, Tailors: Visual, Interpersonal

Teacher Content Notes

Students will know.....

Develop detailed content notes so a substitute or a colleague can teach your lesson. (1-2pages)

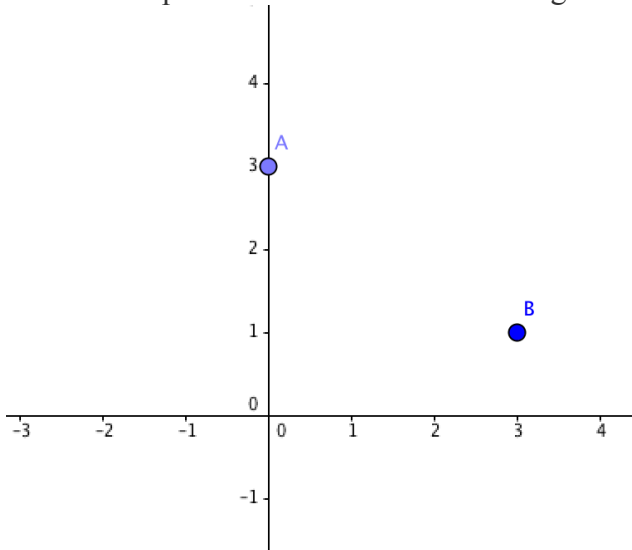
Review using Pythagorean theorem on a triangle. Let class choose what to make two sides, just draw the triangle a different way than the standard right triangle is drawn.

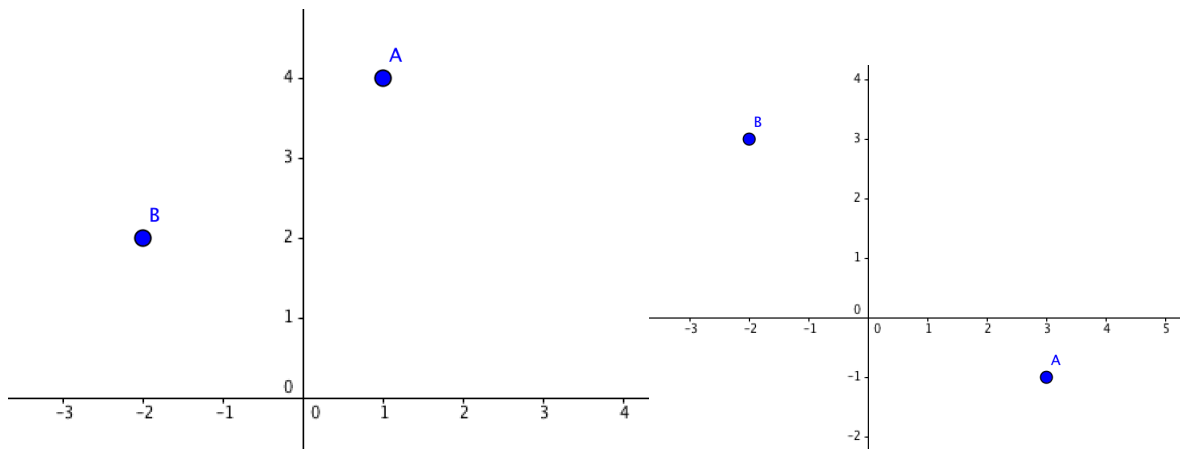
Hook: Have class choose a partner. Then with that partner stand anywhere in the room but not next to each other. Then have them have a discussion with their partner on how they would find their distances between them and where their right angle is that they're using, etc. Have a class discussion where a few pairs share.

Graphic organizer

- Alone
- Then a class discussion

A few examples on board with coordinate grid drawn and two points.





- Where can you find a right angle to use?
- Now make the right triangle
- How do you find the lengths of the sides using the Pythagorean theorem?

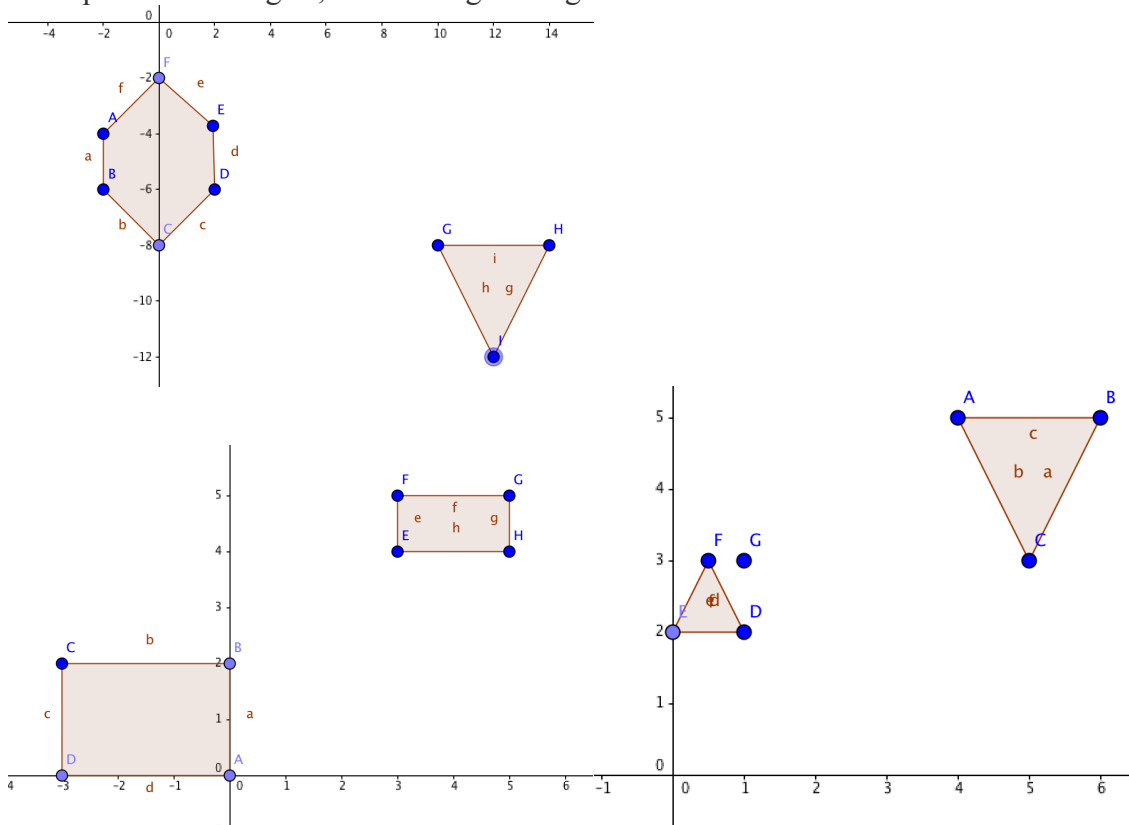
Hand out worksheet packet

Geogebra Introduction, play around on it.

Day 2:

Homework questions?

Examples with triangles, and rectangles on grids.



- Which two points do you want to find the distance between. Now how can we do this using the Pythagorean theorem?

Pythagorean Theorem board game.

Class discussion, what went well and what didn't? What didn't you like?

Geogebra video and rubric. Complete project introduced.

Quickie Quiz/Quick Write

Day 3:

Project work time.

Class Discussion:

What went well with the whole lesson?

What didn't go well?

Handouts

List the items that need to be printed out for the lesson.

- Homework handouts
- Blank Coordinate Grid
- Graphic Organizer
- Geogebra grading rubric

Maine Common Core Teaching Standards for Initial Teacher Certification and Rationale

Standard 1 – Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.

Learning Styles

Clipboard: Students will be able to find the assignments on their teacher's online agenda, and will know due dates and what is expected ahead of time.

Microscope: Students will be able to explore Geogebra and analyze grids and points.

Puppy: There will be a discussion in class and a quick write where students can think and talk about how they are feeling on the content.

Beach Ball: Students can be very creative when they are using Geogebra and when they play the distance activity they can stand anywhere in the room.

Rationale: This demonstrates the standard by allowing students to find unknown distances on coordinate grids using the Pythagorean Theorem.

Standard 6 - Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their on growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Formative:

Section I: checking for understanding strategy during instruction:

The distance activity and the Pythagorean Theorem board game will be played by students.

Section II: timely feedback for products (self, peer, teacher): Students will get feedback on their Geogebra project and get one chance to fix it and pass it in again, and they will also be reflecting on their own work and how they feel with a quick write on the bottom of a quickie quiz.

Summative: Students will have a Geogebra project where they will have to take screen shots of at least three different instances where they found the distance between shapes using the Pythagorean Theorem.

Rationale: Students will not be graded at any point during formative assessment. Everything accomplished during formative assessment will set students up for success for their summative assessment. The summative assessment will incorporate everything they have learned about the Pythagorean Theorem up to this point.

Standard 7 - Planning Instruction. *The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.*

Content Knowledge:

MLR or CCSS or NGSS

Maine Learning Results (MLR) or Common Core State Standards (CCSS) or Next Generation Science Standards (NGSS) Alignment

Common Core State Standards

Content Area: Geometry

Grade Level: Grade 8

Domain: Geometry

Cluster: Understand and apply the Pythagorean Theorem

Standard: 8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Facet: Organize

Rationale: Students will be using the Pythagorean Theorem to find the distance between two points in a coordinate system.

Standard 8 - Instructional Strategies. *The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.*

MI Strategies:

Logical: Students will have to really think through their knowledge of the Pythagorean Theorem to be able to find the distance between the shapes on Geogebra and themselves in the activities.

Verbal: When students do the distance activity, the teacher will ask them to share how the partners figured out how they could find their distance and what they learned in the activity.

Visual: On Geogebra students will be able to draw triangles and visually see how to use the Pythagorean Theorem on a grid between two points.

Intrapersonal: Students will be doing an activity with partners that they are able to discuss the Pythagorean Theorem and how to find distances and discuss with the class.

Interpersonal: Students will be allowed to play the distance activity using the Pythagorean Theorem and also assess their peers on how well they think they understood finding distances using the Pythagorean Theorem.

Kinesthetic: The teacher will have students do a quick activity with a partner and stand apart from each other somewhere in the room, and then try to figure out how they could find the distance between the two of them.

SAMR: Geogebra would be under the Modification level because it allows students to be very precise and have equations and many different tools at their fingertips.

Rationale: Throughout this lesson, students will mainly be focusing on a small target, which is the Pythagorean Theorem in another shape other than a triangle, a rectangle, and finding unknown distances on coordinate grids using it. They will use many intelligence's doing this and make a small project by

themselves that will show their knowledge.

NETS STANDARDS FOR TEACHERS

1. Facilitates and Inspire Student Learning and Creativity. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

- a. Promote, support, and model creative and innovative thinking and inventiveness
- b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources
- c. Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes
- d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments

Rationale: a, b, c, d

Students will be creating their own ways to use the Pythagorean Theorem on a coordinate system and be creative on Geogebra and during the distance activity and the Pythagorean Theorem board game.

2. Design and Develop Digital Age Learning Experiences and Assessments. Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop knowledge, skills, and attitudes identified in the NETS-S.

- a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity
- b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress
- c. Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources
- d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching

Rationale: a, b, c, d

Students will be using Geogebra to create their own hypothetical instances while many MI strategies will be addressed during the lesson. They will have formative and summative assessment that will reflect on the Pythagorean Theorem and what they know.